UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/561,536	12/19/2005	Yukihiro Oishi	052363-0029	9363

20277 7590 02/16/2011

MCDERMOTT WILL & EMERY LLP
600 13TH STREET, N.W.
WASHINGTON, DC 20005-3096

EXAMINER	
VELASQUEZ, VANESSA T	
ART UNIT	PAPER NUMBER
1733	
MAIL DATE	DELIVERY MODE
02/16/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YUKIHIRO OISHI, NOZOMU KAWABE,
KENZABURO HASHIMOTO, and KENJI FUKUDA

Appeal 2010-000889
Application 10/561,536
Technology Center 1700

Before TERRY J. OWENS, JEFFREY T. SMITH, and
LINDA M. GAUDETTE, *Administrative Patent Judges*.

GAUDETTE, *Administrative Patent Judge*.

DECISION ON APPEAL[1]

---

[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's decision finally rejecting claims 1-5, 22, and 23 under 35 U.S.C. § 103(a) as unpatentable over Thum[2] in view of Housh[3] and Hawley's [4], and further in view of Higgins[5] and Callister[6], with evidence from Webster's[7]. (App. Br.[8] 4-6; Ans.[9] 2-3.) We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

Appellants' arguments in support of patentability are limited to claim 1, the sole independent claim. (*See* App. Br. 12.) As such, dependent claims 2-5, 22, and 23 stand or fall with claim 1 (*see* 37 C.F.R. § 41.37(c)(1)(vii)), which is reproduced below from the Claims Appendix to the Appeal Brief:

> 1. A magnesium-based alloy screw having a head portion and a thread portion,
>
> wherein the screw is formed from a drawn wire made of a magnesium-based alloy, and the wire has an average crystal grain diameter of 10 μm or less, and a maximum crystal grain diameter of 15 μm or less; wherein

---

[2] A. Thum & H. Lorenz, *Tests on Magnesium Alloy Threaded Fasteners*, 84 Centre of Darmstadt C. of Higher Educ. 667 (1940). (English translation pages 1-4.)

[3] Susan Housh et al., *Selection and Application of Magnesium and Magnesium Alloys*, 2 ASM HANDBOOKS ONLINE 1 (2002), http://products.asminternational.org/hbk/index.jsp.

[4] HAWLEY'S CONDENSED CHEMICAL DICTIONARY (14th ed. 2002).

[5] RAYMOND A. HIGGINS, ENGINEERING METALLURGY, PART 1: APPLIED PHYSICAL METALLURGY 90 (Arnold 1993) (1957).

[6] WILLIAM D. CALLISTER, JR., MATERIALS SCIENCE AND ENGINEERING, AN INTRODUCTION 174 (6th ed. 2003).

[7] WEBSTER'S NEW WORLD DICTIONARY 157 (3d ed. 1988).

[8] Appeal Brief filed Apr. 16, 2009.

[9] Examiner's Answer mailed Jun. 8, 2009.

the tensile strength of the screw is 220 MPa or higher.

As an initial matter, we observe that claim 1 is drafted in product-by-process format. Thus, while claim 1 is "limited by and defined by the process, determination of patentability is based on the product itself." *In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985).

According to Appellants' Specification, conventional prior art processes for making a magnesium-based alloy screw involved heat treating extruded material to at least 250 ºC. (Spec. [0007]; [0012].) A drawback of these methods was that the lifetimes of the tools used for forming the screw were reduced, thereby increasing production costs. (Spec. [0007].) Appellants are said to have discovered that it is possible to produce a magnesium-based alloy screw using a working temperature lower than 250 ºC (Spec. [0013].) Specifically, Appellants form the screw from a drawn wire having a specific crystal grain diameter. (*Id.*; *see* claim 1, first wherein clause.)

The Examiner finds that Thum discloses threaded fasteners (screws) made from magnesium-based alloys having tensile strengths of approximately 235 MPa to 343 MPa, which is within Appellants' claimed range of "220 MPa or higher." (*See* Ans. 4-5.) The Examiner concedes Thum does not disclose forming the screws from a drawn wire. (Ans. 5.) However, the Examiner contends it would have been obvious to have formed Thum's screws from drawn wire based on Housh's teaching that drawing processes reduce the required number of manufacturing steps and lower fabrication costs. (Ans. 5 (citing Housh "Formability" 1).) The Examiner also concedes the references do not explicitly disclose drawn wire having the claimed crystal grain size. (Ans. 5-6.) However, the Examiner

maintains the ordinary artisan would have been motivated to achieve a small grain size, since smaller grained materials have enhanced mechanical properties. (Ans. 6 (citing Callister 175).) The Examiner further finds it would have been within the level of skill of the ordinary artisan to achieve a desired grain size by optimizing degree of deformation and temperature. (Ans. 9 (citing Higgins 94 and Callister 183).)

The applied prior art discloses the following:

At the time of Appellants' invention, it was known in the metalworking art that "[a] fine-grained material (one that has small grains) is harder and stronger than one that is coarse grained." (Callister 175.) One of ordinary skill in the art was also aware that grain size is a result of the degree of deformation imparted to an alloy and that as working temperature and time increase, grain size also increases. (Higgins 94.)

One method of deforming metal (e.g., to form a wire) is by a drawing technique, which is a process of "gradually reduc[ing] the diameter of a metal rod or plastic cylinder by pulling it through perforations of successively diminishing size in a series of plates." (Hawley's.) "An analogous method is used in sheet-metal forming." (*Id.*) "The technique for hot drawing of magnesium alloy sheet has been developed largely so that drawing can be completed in a single operation." (Housh "Formability" 5.) "AZ31B-H24 [(a magnesium alloy)] sheet is commonly hot formed at temperatures below 160 ºC" (Housh "Formability" 4) and it has been found that "[t]he amount of possible reduction [during hot drawing] increases as temperature increases up to about 230 ºC (450 ºF) for [Mg] alloy AZ31B" (Housh "Formability" 5). According to Housh, in order to maintain the properties of AZ31B-H24, single exposures in normal forming operations

should not exceed the maximum times and temperatures listed in Table 18. " (Housh "Formability" 4). The listed times and temperatures for AZ31B-H24 range from 0.3 to 60 minutes and 163 to 260 °C. (*Id.*) The properties of AZ31B-H24 include a room temperature tensile strength of 290 MPa. (Housh "Introduction" Table 3.)

Where the Examiner establishes a reasonable assertion of inherency and thereby evinces that a claimed process appears to be identical to a process disclosed by the prior art and/or that the products claimed by the applicant and disclosed in the prior art appear to be the same, the burden is properly shifted to the applicant to show that they are not. *See In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990); *In re Best*, 562 F.2d 1252, 1254-56 (CCPA 1977). *Cf. In re Crish*, 393 F.3d 1253, 1259 (Fed. Cir. 2004) ("[W]hen the prior art evidence reasonably allows the PTO to conclude that a claimed feature is present in the prior art, the evidence 'compels such a conclusion if the applicant produces no evidence or argument to rebut it.'" (quoting *In re Spada*, 911 F.2d at 708 n.3)).

Appellants do not dispute that, at the time of the invention, it was known in the art that degree of deformation and high temperature are the factors which affect grain diameter. (*Cf.* Rep. Br.[10] 3.) Rather, Appellants assert that, even if degree of deformation is controlled, it is difficult to control grain growth when forming a magnesium-based alloy at a temperature over 200 °C[11]. (*Id.*) Appellants dispute the Examiner's

[10] Reply Brief filed Aug. 10, 2009.
[11] We note Appellants argue, for the first time in the Reply Brief, that a temperature of 200 °C or less is critical to control grain growth. While the Examiner explicitly found that Housh discloses temperatures below 250 °C,

contention that Housh suggests using temperatures below 250 °C to form a drawn wire, and argue that because the applied prior art fails to suggest forming a drawn wire at the temperatures used in Appellants' drawing method, the Examiner's proposed combination would not result in a wire having the claimed crystal grain diameter. (Rep. Br. 2.)

Appellants' argument is not persuasive. The evidence of record supports a finding that one of ordinary skill in the art would have reasonably expected the temperatures used in a sheet metal drawing procedure to be applicable in an analogous wire-drawing method. (*See* Hawley's *supra* p. 4.) Housh discloses deep drawing at temperatures which overlap those used in Appellants' drawing method. (*See* Housh "Formability" Table 18.) Appellants have not produced evidence to support their contention that one of ordinary skill in the art would not have looked to Housh's exemplary deep drawing technique in considering a method of making a screw, because the technique is used for hot drawing of magnesium alloy sheet, rather than wire. (*See* Rep. Br. 3.) Moreover, because Appellants have not shown any criticality in the other drawing conditions used in their method (e.g. speeds)[12], it was reasonable for the Examiner to conclude that a wire formed

---

Housh also discloses temperatures below 200 °C. (*See* Ans. 8-9, bridging para.)

[12] We have considered the comparison testing in the Specification, but determine it is not commensurate in scope with claim 1. Testing was conducted on a single alloy ("material corresponding to ASTM AZ31" (Spec. [0039])), although claim 1 is not limited to a particular magnesium-based alloy. Moreover, a comparison was only made with extruded material and not with other types of materials used to form magnesium-based alloy screws. In this regard, we note Appellants have not produced evidence to support their contention that the ordinary artisan would not have used the material in Housh's deep drawing process to make screws. (*See* Rep. Br. 3.)

by conventional drawing techniques at a temperature within the range used by Appellants would have resulted in a wire having the claimed crystal grain diameter (*cf.* Ans. 9-10, bridging para.). *See In re Thorpe*, 777 F.2d at 697 ("If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.").

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1).

AFFIRMED

bar

MCDERMOTT WILL & EMERY LLP
600 13TH STREET, N.W.
WASHINGTON, DC 20005-3096